

# Industrial Rescue

## Rescue from vessels begins with safe design - Part I



by **Dipl.-Ing. Werner Sterk**

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The national occupational safety and health regulations in countries such as Italy and Germany require employers to ensure that persons can be rescued without delay in the event of an emergency. In some cases however, access openings on tanks and vessels are very small by design. A person may just about be able to access the vessel, but rescuing them through the same opening when they are no longer conscious is not always possible. The body of regulations of the German Social Accident Insurance (DGUV) contains recommended minimum dimensions that are sufficiently large to permit the rescue of persons. These recommendations are however not directed at manufacturers, but serve only as a guide for operators when selecting vessels for purchase. Operators may not be aware that although they are purchasing a vessel that complies with the standards, it could present them with difficulties later on. Together with the responsible DGUV subcommittee and European partner bodies such as EURSAFE in Italy, the Commission for Occupational Health and Safety and Standardization (KAN) is lobbying for improvements to the relevant European standards.

Fig. 1

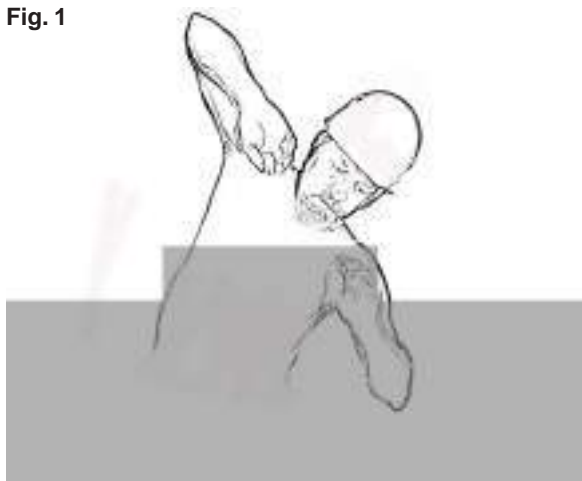


Figure 1: Person inserting themselves into a pressure vessel; image: R. Schuber.

To enter a pressure vessel in order to conduct maintenance, repair or inspection, the worker must insert him or herself through a standardized oval manhole aperture measuring 320 mm x 420 mm [Figure 1]. Should a medical emergency arise, such a small opening makes rescue extremely difficult, as the person cannot assist in extracting themselves from the vessel again through the opening if for example their mobility is restricted or they have lost consciousness. This in turn presents the employer with the problem of fulfilling his legal obligations, namely of ensuring that a person can be rescued and provided with medical care without delay. The "Vessels, silos and confined spaces" Subcommittee of the DGUV's "Raw materials and chemical industry" Expert committee has drawn attention to this problem<sup>1</sup>.

### Differing statutory requirements for production and operation

To facilitate understanding of the problem, a clear distinction must be drawn between the legal spheres of the safety and health of workers at work and product safety. Figure 2 contains a simplified presentation of the European and national statutory requirements and the body of technical regulations supporting them.

- **Requirements in Germany concerning the safety and health of workers at work**

The German Ordinance on industrial safety and health (BetrSichV) is based in part on the German Occupational Health and Safety Act, which transposes the European OSH Framework Directive 89/391/EEC at national level. The requirements apply to the employer. Section 11 (2) of the BetrSichV states that the employer is obliged to ensure that in the event of an accident or emergency, workers and other persons can be rescued and provided with medical care without delay. This includes provision of suitable access and entrances to work equipment, and of the necessary anchoring facilities for rescue equipment on and in work equipment.

The rules of the German Social Accident Insu-



rance constitute technical recommendations for employers to ensure safety and health in specific application scenarios. Part 1 of DGUV Rule 113-004, "Work in vessels, silos and confined spaces", describes safety measures regarding work in vessels, silos and confined spaces [2]. These include, for example, measures for protection against hazardous substances and hazardous media, and measures providing protection against mechanical and electrical hazards. Access techniques and emergency measures are further top-ics of this DGUV Rule. Annex 4 contains suitable dimensions for access openings. The minimum dimensions for the access openings are based upon the experience

of experts from the German Social Accident Insurance, companies and rescue personnel.

- **Product safety requirements**

Product safety requirements apply to the manufacturer. They are fully harmonized in European law for many product areas and are therefore the same in all Member States of the European Union. Pressure equipment (such as pressure vessels) with a maximum pressure exceeding 0.5 bar must meet the essential safety and health requirements of the European Pressure Equipment Directive. The directive requires pressure vessels to be equipped in such a way that examinations can be

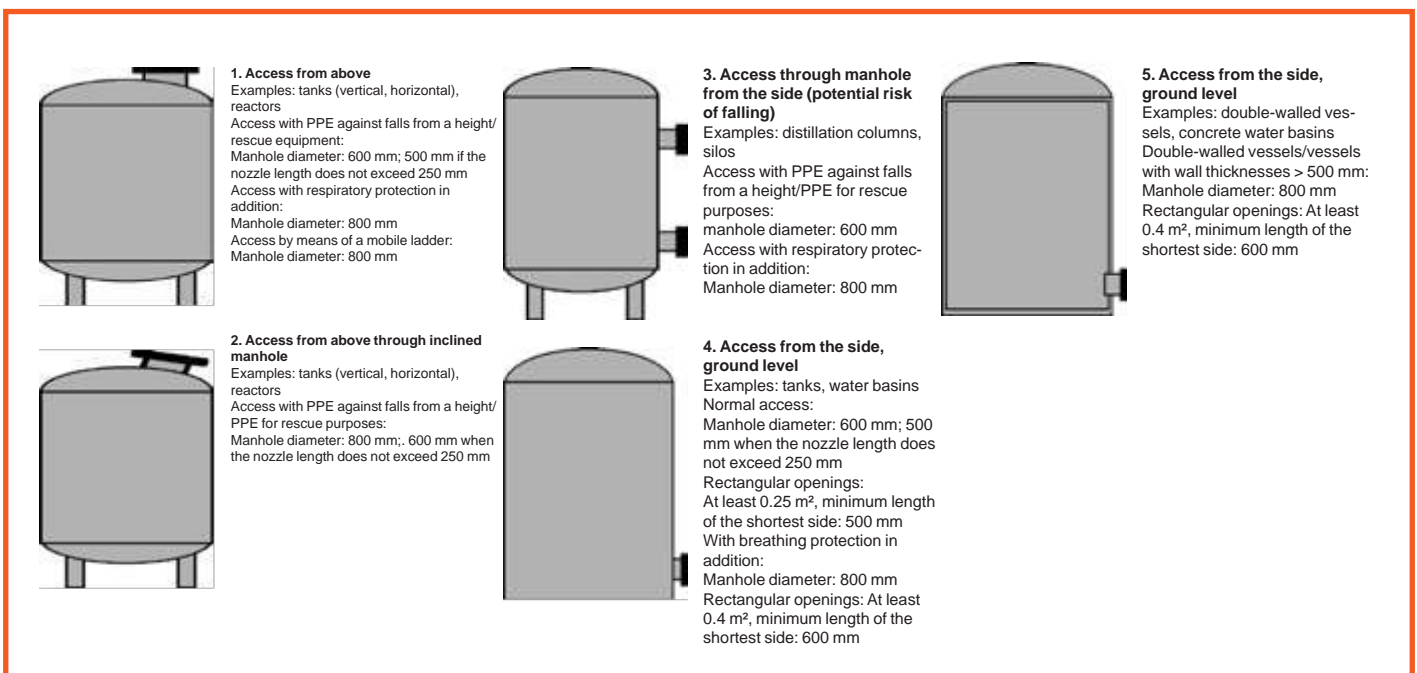


Figure 2: Suitable opening dimensions to DGUV Rule 113-004, Annex 4.



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EU Pressure Equipment Directive, Annex I, 2.4 Means of examination: b) Means of determining the internal condition of the equipment must be available, where it is necessary to ensure the continued safety of the equipment, such as access openings allowing physical access to the in-side of the pressure equipment so that appropriate examinations can be carried out safely and ergonomically.

#### **The role of European standards and national specifications**

The essential requirements set out in the European Pressure Equipment Directive are binding for the manufacturer. They are however formulated in general terms and are supported by harmonized European standards. Application of these standards is voluntary. However, where the standard concerned is listed in the EU Official Journal, it gives rise to a presumption of conformity with the essential requirements of the EU directive (usually presented in Annex ZA of the standard) covered by the standard. European standards within the scope of the Pressure Equipment Directive

are developed in working groups of the European Committee for Standardization (CEN), which are supported at national level by mirror committees, e.g. at UNI in Italy or DIN in Germany. A manufacturer may however draw upon other specifications in order to meet the essential requirements of the Pressure Equipment Directive. Such specifications include the AD 2000 data sheets prepared by the AD working group for pressure vessels and published by the VdTÜV (Association of Technical Inspection Agencies).

A number of these standards and specifications permit dimensions for access openings of 320 mm x 420 mm, and in some cases only 300 mm x 400 mm. An opening of this size makes swift and stress-free rescue in an emergency extremely difficult. The thickness of pressure vessel walls normally prevents an opening in the vessel wall being made quickly.

#### **Applications for revisions of standards and specifications**

In order to improve the situation concerning access openings, which the OSH lobby considers to be too narrow, KAN and its partners have submitted applications to DIN for revision of the European standards EN 13445-5,





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Fig. 3



Figure 3: Statutory references for product properties and operation

The Commission for Occupational Health and Safety and Standardization (KAN) unites the stake-holders in occupational safety and health in Germany. These parties use KAN as their common voice and benefit from the influence gained by channelling their position. The chairmanship of KAN rotates every two years between representatives of employers, trade unions and the state. The topics covered range from work equipment such as machinery, pressure equipment and personal protective equipment, through construction products, to ambulances and school bags. In addition, standards and specifications governing services and management systems of socio-political relevance are also growing in importance, as are the impacts upon health for example of nanomaterials or the non-visual effects of artificial lighting. Issues associated with digitalization are also increasingly coming to the fore.

KAN's work is supported by a secretariat. Further information: [www.kan.de](http://www.kan.de)



Unfired pressure vessels, and EN 12953-3, Shell boilers [3,4]. An application has also been submitted to the VdTUV for revision of the AD 2000 body of regulations [5].

The technical standards of importance for the design of pressure vessels are developed at Euro-pean level.



Figure 4. Research work at Politecnico di Milano

For this reason, technical discussion between OSH institutions in different countries is essential if standards and specifications are to be improved with respect to occupational safety and health. Cooperation with institutions such as EURSAFE in Italy is an excellent example [6].

At the same time, KAN and the DGUV have entered into dialogue with manufacturers, operators, works fire services, industry associations, trade unions, public authorities, testing bodies and training institutions. The aim was to raise awareness of the problem and to lobby for larger access openings. Discussion – involved and at times confrontational – with the various interest groups, the progress made and the current state of technical progress will be reported in the next issue of the Industrial Research Journal.

References

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- [2] DGUV Regel 113-004 Vessels, silos and confined spaces, Part 1: Work in vessels, silos and confined spaces, February 2020
- [3] European Standard EN 13445-5, Unfired pressure vessels – Part 5: Inspection and testing
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- [6] Adriano Paolo Bacchetta, EURSAFE; Giuseppe Nano, Ivan Belianin, Indrit Dangaj, Politecnico di Milano: Accesso sicuro all'interno delle attrezzature a pressione, KAN-Brief 4/17, p. 5